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AUTHOR	Smith, Anthony Wayne
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ABSTRACT

Addressing the Seventh American Water Resources Conference, Washington, D. C., October, 1971, Anthony Wayne Smith, President, National Parks and Conservation Association, presents an expose on how rivers should be managed by methods which restores and preserve the natural life balances of the localities and regions through which they flow. The outmoded and destructive objectives of water resources management currently practiced by government agencies and regulated utilities is duscussed in relation to technological advances. The big dam system is attacked, together with the system of water management which it presupposes. This includes such aspects as irrigation, reclamation projects, hydroelectric power, flood control, water supply, pollution abatement, navigation, low-flow augmentation, and recreation. To prevent pollution, strict regulations which will equalize costs are necessary. Also, a complete reversal of present river basin management policies by public agencies, public utilities, and private business is called for. The concept of full development, expressing modern preoccupation with technology and engineering, must be changed to an approach of ecological management. Management and development which will supply all human needs can and must be provided by methods which are compatible with the preservation of the life environment. (BL)

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ECOLOGICAL RIVER BASIN MANAGEMENT

An address delivered by Anthony Wayne Smith, President and General Counsel, National Parks and Conservation Association, to the Seventh American Water Resources Conference sponsored by the American Water Resources Association at the Statler-Hilton Hotel in Washington, D.C., on October 26, 1971. The others in the panel of speakers were: Lieutenant General F. J. Clark, Chief, U.S. Army Corps of Engineers; Ellis L. Armstrong, Commissioner, Bureau of Reclamation, Department of the Interior; Theodore M. Schad, Director, National Water Commission; Enzo Fano, Associate Chief, Resources and Transport Division, United Nations.

THE INVITATION TO address this plenary session of the Seventh American Water Resources Conference was very welcome, and I am happy to be here.

I think of the American Water Resources Association as an organization of persons highly skilled in the many techniques of water resources management, devoted professionally to the public interest.

We need such organizations in a democracy to support our governmental agencies when they do well and to help to correct them when they do badly.

I shall be speaking to you today as President and General Counsel of the National Parks and Conservation Association, except with respect to matters necessarily involving legislation. The NPCA testifies occasionally on legislative matters on official invitation by committees of Congress, but not otherwise.

In respect to legislative questions I shall be speaking only as an individual; however, you will find previous statements, given on behalf of NPCA on official invitation, to be in harmony as a general thing with the positions I shall express here today.

The NPCA is a non-profit, educational, and scientific organization with about 55,000 members in the United States and abroad, all of whom receive the monthly National Parks and Conservation Magazine, The Environmental Journal.

I am an attorney, specializing in governmental operations, particularly with respect to natural resources management, and with a primary interest in the goals and purposes of such management.

THE BURDEN OF MY COMMENTS this morning is that the major objectives of water resources management, as currently practiced by government agencies and regulated utilities in the United States are outmoded and destructive. I shall discuss the subject mainly in terms of river basin management.

The focus of river management for at least 75 years has been *the big dam*. The big dam has been an idol, invested with an almost superstitious awe. Seen from downstream it is often beautiful, but its effects on the impounded river, both upstream and downstream, have too often been highly destructive.

In this country, and now worldwide, the big dam and reservoir have been linked with *big irrigation*. In America this has helped create surplus crops, while we were paying out good public money to reduce such surpluses. Elsewhere in the world the big irrigation dam has had many unfortunate social and environmental consequences which could have been anticipated, but were either unforeseen or ignored. I shall return to that question later. At any event, the time has come in the United States, in the judgment of many of us, to terminate the big reclamation program.

ANOTHER MAJOR PURPOSE of the big dam has been *hydroelectric power*. There has been a very elaborate development of such power sources in the United States during the past 50 years. The total contribution to the satisfaction of the electric energy needs of the American people has always been relatively small, and now grows yearly less and less significant; it is trivial. The question then becomes whether the remaining kilowatts are worth the environmental damage done. Most environmentalists answer with an emphatic "No."

Flood control has been another major purpose of the big dam in America, and around the world. There has always been an alternative, the small flood detention structure in the headwaters. Properly built and managed, headwater detention structures do not result in the defacement of the locality by heavy drawdowns, nor destruction by permanent inundation. This approach is quite a different thing from the construction of sizable artificial lakes in farm and forest country; the real motive for the latter is usually real estate speculation. However, the most sensible alternative to the large flood control reservoir, which is destructive environmentally, is good flood plain management. The Army Engineers have been doing some good long range thinking with respect to this new approach.

New structures need to be zoned out of the flood plains by state or federal zoning. The owners of existing structures should be offered insurance on a once-only basis, subsidized if need be. The present indications seem to be that the economics of flood control will be definitely favorable to flood plain management, as contrasted with reservoirs, in most cases from now on; probably they always were.

Water supply is naturally one of the important purposes of river basin management. The big reservoir has been favored in the past for this purpose, as maintaining an even flow for communities and industries below the reservoir. But it is not essential for this purpose; small local water supply reservoirs give the locality better control over its own water supply. This has been part of the merit of the headwaters programs of the Soil Conservation Service for water supply purposes.

Moreover the big reservoirs are often quite distant from the consuming metropolis, as for example in the case of the dam at Bloomington, Maryland, for the supplemental water supplies of the City of Washington, D. C. This induces elements of time-lag, risk, et cetera, which can be avoided by local supplies. In the case of Washington, of course, the supply is readily available in the fresh water estuary.

Pollution abatement has been thought of in the past as a meritorious purpose of big reservoirs. During the period when the Army Engineers were proposing some 16 such reservoirs for the Potomac Basin, federal water law was moving along rapidly toward the prevention of pollution at source. Prevention at source, not dilution will be the method of the future.

Look at *municipal* pollution. The American public has pretty well decided that cities are not entitled to pour filth into our rivers; nor plant nutrients, which induce secondary pollution. The money which has been spent on big reservoirs for the dilution of pollution will be transferred more and more

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to financial assistance for municipalities in improving their treatment plants.

Look at *industrial* pollution. The laws and agencies which have been developed in the course of the last decade for the reduction of municipal pollution at source have not been adequate for industrial pollution. But here again, this clock will not be turned back. The public is going to insist that the pollution of our streams, rivers, lakes, and estuaries by industry must stop.

THIS CALLS MAINLY for tough regulation; such regulation will *equalize costs* as between businesses which desire to follow good public policy and those which might cheat at the expense of competitors and the public interest. Strict regulation should be favored by public-spirited industry.

In any case, with respect to both municipal and industrial pollution of streams, rivers, lakes, and estuaries, the handwriting on the wall is very plain. The American people will not permit this kind of pollution to go on very much longer. The prevention of pollution has become a first-class issue for able politicians, and the rest is going to follow.

Look at the problem of *heat* pollution. Factories and utilities can pour hot water into streams as one way of handling excess heat; or they can use cooling towers. In the past the government has built expensive dams to store water for release into the rivers to cool the hot water dumped by industry. More and more, the environmental groups will be opposing this practice in the Legislative, Executive, and Judicial branches of government. Sooner or later heat pollution of our streams will be stopped at source.

We are all aware of the problems, limitations, and costs of cooling towers. Along that line, however, the major solutions lie. The environmental costs (as distinguished from excess profits) will have to be loaded into the rate structure; the rate structure will have to be weighted more heavily on the big power users and less heavily on the small consumer; rates should go up, not down, with large-block consumption. The regulatory commissions can make the changeover; if they do not, it will certainly be done by legislation.

We are also aware that as the utilities shift over from fossil fuels to atomic fission, the cooling problem increases. Even if we get over from fission to fusion, which now seems closer than it used to seem, the heat disposal problem will be serious. Rate structure changes could lead to a sharp reduction in the escalation of power consumption; this would be meritorious, because power consumption has run away with us all.

The *pumped* storage reservoir compounds the problem. Environmentalists have fought and stopped a number of pumped storage projects which they considered highly undesirable. The objectionable qualities of the normal storage reservoir, inundation, deep drawdowns, evictions from homes, farms, businesses, and communities, become even more serious with the pumped storage reservoir. The answer has to lie in the construction and utilization of excess capacity at the regular plant. Obviously this adds to capital costs, and operating costs as well; it is part of the internalization of environmental costs which will be essential if the life environment for great numbers of human beings is not to be wrecked.

In passing, we can comment on *navigation* as a purpose of river basin management. River navigation may have been important when competition with the railroads was thought necessary to supplement rate regulation. But public highways provided that competition to the point where the railroads are surviving with great difficulty. A return to the rails for both passenger and freight purposes will be part of any sound national transportation policy for the future.

Recreation is now built into the benefit-cost ratios to justify big reservoirs. This is a strictly phony calculation in most instances. Big reservoir recreation involves mechanized equipment; it is naturally supported by the motor boat and fishing tackle industries. Their trade associations are constantly on the job. But it displaces superior recreation, such as angling along natural streams, camping, picknicking, and hiking in natural stream valley country. The two forms of recreation cannot be compared in monetary terms; certainly as now used in benefit-cost calculations; there are too many intangibles. In the judgment of most environmentalists, we ought to let our stream valleys alone when it comes to recreation.

Speaking of *water* supply, again, the main thing needed is to prevent pollution. When municipalities and industries return their waste water to the streams in as good condition as when taken out of the river, there will usually be no water supply problem.

A GOOD TEST OF PERFORMANCE would be the requirement that the waste water be returned to the stream at a point upstream from the intake. This does not necessarily mean direct recycling. The water can go back into the river for a time. Even if returned downstream, it is in condition for use at the next municipal and industrial intake farther down.

Direct recycling where the purified waste water is returned to the water mains will always be possible. The President's science advisor published a statement about four years ago stating that this could be done with techniques then available at the big treatment plants at New York City. But the value of complete purification does not depend on direct recycling. Purification is the point, not recycling.

There are various kinds of *surface water pollution*. One is the runoff from cities, which can be surface water from streets, land, waterfronts, not necessarily passing through storm sewer systems. If, as, and when this is important it should be taken into the storm sewer systems.

The well-known problem of *storm sewer pollution* has been over-stressed; when it is serious, holding tanks should be built, or the sanitary and storm systems should be separated, or excess capacity should be provided in the treatment plants.

All of this will be expensive; but this is but one of a great many costs which we incur when we allow ourselves to be trapped into uninhabitable cities. The money which is being wasted on big storage dams for the dilution of pollution should be transferred instead to the solution of the sanitary problems *of* the cities *at* the cities.

ANOTHER KIND OF SURFACE runoff pollution is *agricultural pollution*. I have been a commercial dairyman for some 15 years on a rather large scale. I am a member of most farm organizations. I am deeply sympathetic with the problems of the farmer. But I think that the farmers would prefer not to pollute the environment in which they and other human beings live. I think there are going to be some cooperative efforts to overcome these difficulties.

The problems include runoff containing pesticides and excess fertilizers. Other ways will be found for dealing with pests; research and development have traveled a long way already. And excess fertilization is waste, expensive to the producer. Some fertilizers produce more waste than others; technical information and assistance, and well considered controls, are needed.

In any event, the big reservoir does not solve the problem of pollution from land runoff. The chemicals do not decompose.

They get washed downstream to the estuaries. They cause eutrophication in the estuaries. The estuaries are important food-producing and oxygen-producing engines. They should not be tampered with. Inevitably the problem comes back to prevention of pollution at source, and we should develop suitable institutions for that purpose.

NO DISCUSSION OF river basin management would be complete without touching on *low-flow augmentation*. Augmentation is the last refuge of the rascals who insist on managing every drop of water in the river. This insistence is pathological; it is a compulsion, in psychiatric terms. For many reasons modern man is psychologically insecure, and he protects himself by trying to run everything. It is impossible, he thinks, to let nature take its course anywhere. As technologists, if I may say so, you need to be on guard against that sort of nonsense.

Low-flow augmentation may benefit some of the real estate speculators downstream from the dam who want to subdivide the waterfront, but it benefits no one else. The natural biological balances of the streams are always injured by storage and augmentation, by abnormally high flows as a result of augmentation in seasons when the water would naturally be low, and abnormally low flows as a result of storage in seasons when a measure of flooding would be natural.

THE NATIVE LIFE SYSTEMS of the streams need the seasonal fluctuations of water, within which, through countless eons, they evolved. Man is usually an impertinent meddler when he changes the natural fluctuations of the streams. Why should we interfere?

At the moment we are talking for the most part *technology*. I shall return to purposes in a moment. There have been hopeful indications that the water resources management agencies have been looking in a very sensible direction with respect to municipal pollution; namely towards *spray irrigation*, the so-called living filter.

There is no need to be simplistic about this approach. There will be some places, some soils, for example, where it will work better than elsewhere. But in general, research, experimentation, and application all indicate that tertiary treatment by spray irrigation serves the dual purpose of irrigation and fertilization for both farm and forest land, and completes the purification process.

If we had not been so wedded, as modern industrial men, to the techniques of big construction and big machinery, we would have known this from the beginning. Every farmer who spreads manure on a field understands the basic proposition. Washing good natural fertilizer out to sea is a stupid procedure.

There are many other helpful techniques; composting, for example, which was explored quite thoroughly by Frazer of Kaiser-Frazer fame many years ago, should be pushed for solid organic wastes. Once you internalize environmental costs, composting may turn out to be the most economic method. It rather looks as if we shall have to move over from chemical fertilizers to organic fertilizers to solve the eutrophication difficulty.

IT IS A MISTAKE to suppose that we need to go very far afield to find the techniques to do the pollution prevention job. This is largely a process of adding tertiary treatment to secondary, to primary. For industry it is largely a matter of leaning no longer on government subsidy for water to flush industrial wastes; the rapid development of by-products, which can often be profitable, will probably follow on tough regulation; and tough regulation is coming.

Let us look for a moment at the objectionable features of the big reservoir from a social point of view. First of all, it calls for evictions by the use of the power of eminent domain; people are tired of being pushed around in this fashion by federal condemnation for super-highways, jetports, and big reservoirs. The whole thing has a totalitarian flavor about it which is basically foreign to American ideals; if accepted, it produces attitudes of submission and hopelessness which could lead people to accept the methods of dictatorship.

I do not wish to be misunderstood; the considerate employment of the power of eminent domain in carefully appraised situations where the result will definitely be in the public interest will always be an essential element of good government. We are talking about the use of the power for the wrong purposes, without adequate public notice and hearing, without consideration for the values which are destroyed.

THE PROTESTS WHICH great numbers of people have been lodging against big reservoirs in the Legislative, Executive, and Judicial branches of government are usually merited. The habit of mind of the promoters of these projects has been to brush these protests aside as ridiculous; they are not ridiculous, and they are going to prevail, because basic human values are involved.

From an *ecological* point of view, the big reservoir and the system of water management which it presupposes are completely unsound. First of all, they destroy the stream valleys in which the dams are built; these valleys always harbor forms of plant and animal life, soils, and other resources which are of importance to the human community. Men are now beginning to understand what can be called the ecological imperative: that they must live within the total network of life or perish.

Ecology is not a kick; ecology is a science; and it supports a moral imperative which is related to the survival of the human race itself; no longer can men indulge in the wanton destruction of the life which surrounds them; we know now that to do so is to destroy ourselves.

This is serious business. Public agencies must regard it as such. It is a matter of life and death, of survival. It can no longer be brushed aside. Institutions like the American Water Resources Association, hopefully working with organizations like the National Parks and Conservation Association, and the other major environmental groups, must join together to see to it that public agencies, including public utilities, and indeed including so-called private business (the big stock-market corporations are actually public institutions), conduct themselves with exacting respect for the ecological resources at stake in our river basins. This means a complete reversal of present river basin management policies.

NO LONGER CAN THE American people tolerate the destruction of farm land by inundation under reservoirs; nor the destruction of timberlands, however poor they may be as a result of past mismanagement, for in time they will recover; nor the necessity to move communities, homes, churches cemeteries, to other locations; nor the demolition of invaluable historic sites and buildings; nor the destruction of scenery, which is the world in which we live.

Many of the values mentioned are intangibles; for the most part any effort to translate them into monetary terms will fail, or will distort the issues; a benefit-cost test for monetary tangibles may be useful, although always difficult and treacherous; but a favorable monetary ratio cannot be regarded as a justification, nor as containing the entire story, nor for the most

part any great part of the story, of the true benefit-cost relation. Rational analyses of the genuine human issues involved must be substituted; there is no mathematical formula for such calculations. Nor can you put them on the computers.

If the big dam system is so bad, why does it have such momentum? You would think that the answers would be taught in our schools of political science; apparently this is not so. In fact, they should be taught in the grade schools; the question is basic to the welfare of modern man.

Anyone acquainted in practice with the social processes involved assumes the following: the government agencies and their career officials have a stake in pushing and enlarging their programs, right or wrong, and it is easy to convince oneself that they are right; the polluters get big returns from public investment in storage reservoirs to dilute the filth; many municipalities are bankrupt, and need help for treatment plants; the construction contractors and materials suppliers, and some building trades unions as well, like to keep projects going, even if socially destructive; real estate speculators can often profit by unsound speculative subdivision; and financial contributions from interested parties find their way back very often into the campaign chests of politicians who become committed in advance to specific projects, with respect to which their constitutents may know nothing.

If we can set a new range of goals and values before us in water management, we may be able to mobilize the popular forces, combinations, coalitions, which will be needed to stop this kind of predation upon society and get our business and governmental institutions working in these matters for, and not against, the nation.

WE HAVE JUST WITNESSED one of the greatest river management follies of all times, the Aswan Dam in Egypt. This structure was built for political reasons, not sound river basin management purposes. It appeared as a result of political rivalry between the United States and the Soviet Union. It was a wrong-headed approach to the basic problems with which Egypt was contending.

The multiplication of snail-borne disease in the irrigated lands was one immediate consequence; efforts to counteract this effect will be costly, and probably ineffective; they will lead to their own problems in train. The destruction of the sardine resources of the Mediterranean will at best be offset by possible new fish resources in the reservoir; in fact, however, the balance is in doubt.

Changes in the salinity of the coastal waters, with complicated destructive effects, and increased erosion along the delta as a result of changes in ocean currents, produced by changes in the flow of the river, may in time be catastrophic. Artificial fertilization must now replace the annual fertilization by sedimentation which nourished Egyptian civilization from the most ancient days; artificial fertilization will bring eutrophication.

Destructive ecological effects have been appearing around the reservoir itself. The reservoir will probably never fill, because deep-seated alterations in continental water flows, taking water completely out of the Nile basin, appear to be following upon pressure changes in the storage basins. Calculations of evaporation were completely erroneous; the net water supplies expected will not be produced.

Had the problem been approached in terms of investments in sanitary facilities, in population stabilization, and in agricultural education, coupled with well considered agricultural modernization methods, the per capita standard of living of the Egyptian people could have been lifted significantly during the period when the Aswan project was under development; now the standards are falling.

The true explanation of the Aswan Dam lies not in any merits of the structure, but in the superstitions of modern men that big reservoirs are always good, in the rivalries of great powers in a small country, and in the disposition of national leaders to build themselves political memorials. American foreign policy should resist this kind of destructive activity abroad.

WE ARE ABOUT TO get into a similar go-round in the Mekong River Basin in Southeast Asia; fortunately, during the interval, more ecological understanding has grown up among river basin managers. Regional cooperation among governments with differing purposes also appears to be feasible. The Mekong experience thus far indicates that this is true; but the purposes and methods need to be revised.

The catch phrase *full development* has been the express or implicit presupposition of river basin planning everywhere for several generations. It expresses modern preoccupation with technology and engineering. The whole approach needs to be changed; the central concept needs to be *ecological management*. Biological and physical scientists, agronomists and engineers, public officials, should now be working together toward plans and programs for water resources management which will turn around the preservation of *existing ecological balances;* and which will turn around the *stabilization*, and not the disruption, of human communities.

An ecological and a humanitarian conscience are both needed. Public service organizations like the American Water Resources Association and the National Parks and Conservation Association should be bending all their efforts toward creating and sustaining that kind of social conscience.

The forthcoming United Nations Conference on the Human Environment in Stockholm next year is a sign of the times; likewise the UN Conference on the Law of the Sea, which will deal with marine resources and environment, in 1973; and the Conference on Population in 1974; all expedited, without doubt, by the prevailing concern for the life environment.

The present world crisis is not merely environmental, nor does it involve only natural resources, nor is it only economic, nor only a population crisis, but it is the crisis of the survival of life on earth as a whole. Many farsighted leaders in many professions have been saying this now for a long time; the warnings should be taken seriously. In respect to water resources management, it means turning ourselves around, working for the ecological protection of our river basins, not for so-called full development. Management and development which will supply all human needs can be provided, if we so decide, by methods which are compatible with the preservation of the life environment.

Let us set ourselves new goals and work together for them. Let us visualize river management policies which will restore the pristine purity of all our waters. Our rivers, lakes, and estuaries should be made safe, not only for utilitarian purposes, but for boating, which is a more exacting test, for swimming, which is still more exacting, and for drinking. Absurd? Not at all, this is a rational and a practicable goal.

Our rivers should be managed, looking toward those ends, by methods which restore and preserve the natural life balances of the localities and regions through which they flow. These are the only standards for water management on which a genuine civilization can be built. The emergency is grave, the time is short, but the rewards of success which can come from working together could be splendid.